NEST REPAIR IN LAUGHING GULLS

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The nests that Laughing Gulls (*Larus atricilla*) build in their marshy habitat along the coast of New Jersey are essentially 2-part constructions. First, a platform is built by carrying nest material, primarily dry *Spartina* grasses, to the site. As demonstrated by Bongiorno (1970), Laughing Gulls frequently select *Spartina* mats that have been formed by tide action as nesting sites. This gives the gull a more extensive platform capable of floating at high tide. Second, a simple concavity with a rim is formed by the Laughing Gull working from within the nest. In the normal course of nestbuilding, the Laughing Gull builds the rim gradually and more or less uniformly. It is possible for a well-constructed nest to be built of essentially random placement since the bird frequently changes its orientation in the nest, and alternates, in some undetermined fashion, between 3 different positions for placing the nest material: left, right, or directly in front. Alternatively, the gull may use information about the condition of the nest to determine the position in which it will place the nest material, the direction in which it will orient its body, or both. Both tactile and visual information from the nest rim are at least potentially available to a sitting gull.

Building while in the nest involves many different motor components, but the one that is of major importance here is the "sideways-building" movement described by Beer (1963a) for Black-headed Gulls (*Larus ridibundus*). It consists of reaching over the rim of the nest, picking up nest material in the bill, and placing it in the rim of the nest alongside the bird's body. The movement most frequently entails moving the head either to the left or the right before dropping the nest material, hence the name. Sometimes, however, the nest material is drawn directly toward the chest of the sitting bird and placed there. As in Black-headed Gulls (Beer 1963b), this behavior pattern is maintained throughout the incubation period of Laughing Gulls.

Moynihan (1953) has argued that nestbuilding during the incubation period of gulls is a displacement activity. It occurs inappropriately, he argues, when incubation has been frustrated in some way. It has been shown by Beer (1963b), however, that sideways-building is temporally related to rising and settling on the nest and independent of collecting nest material throughout the reproductive cycle. This suggests that the sideways-building components, but not the collecting components, of nestbuilding share causation with behavior patterns normally classified as incubation patterns. Thus, any manipulation that increases rising and settling will increase sideways-building.

My study was designed to determine if sideways-building could be altered, either in frequency or direction, by modifications of the nest during the incubation period. Specifically, the effects of (1) damaging and (2) wetting the nest on subsequent sideways-building activity were examined.

METHODS

Nests of Laughing Gulls on the Brigantine National Wildlife Refuge were marked and censused daily. The nests of 44 gulls in mid-incubation (1–3 egg clutches; median and mode = 2 egg clutch) were randomly divided into 3 groups and treated as follows:

Group D: Sixteen nests were damaged by having one-half the rim removed. Shears were used to cut through the rim so that a semi-circle of nest material could be removed. Alternate nests were cut on an east-west and on a north-south axis. The edges of the cut were marked with black waterproof ink.

Group W: Sixteen nests were marked in a manner corresponding to Group D, but the nests were not cut. Instead, a quantity of water (approximately a quart) was poured over half the nest, alternating sides as in Group D. This had the effect of saturating the nest material in half the rim, but did not leave water standing in the nest.

Group C: Twelve nests were marked as for the other 2 groups but were not further manipulated. For purposes of analysis, the half of the nest corresponding to the treated half of an experimental nest, matched on the basis of testing order, was scored as the "treated" half.

Immediately following the nest manipulations, 24 pieces of dry *Spartina* reeds, cut into 30 cm lengths and marked by dipping each end into black paint, were placed immediately alongside the rim of each nest. Half the pieces were placed on either side of the nest and were positioned so that their midpoint was at right angles to the cut, or the equivalent line drawn on uncut nests.

The nests were left undisturbed for 3 hours at which time they were revisited (3-hour check). Examination of the nests consisted of counting the number of marked pieces of nest material that had been incorporated into the nest and the number placed either wholly in the treated (damaged, wet, or matched control) or the untreated half. The nests were again left undisturbed until they were scored again the following day (24-hour check), to conclude the experiment.

The experiment was conducted on 3 separate and consecutive days with 20 nests treated the first day and 12 the following 2 days. The initial plan of having 20 nests in each group had to be abandoned when a storm and high tide decimated the remaining nests in the colony.

RESULTS AND DISCUSSION

Although all groups engaged in some nestbuilding activity during the first 24-hour period, neither manipulation affected rate of sideways-building as measured by incorporation of marked nest material into the nest (mean no. marked reeds in nest at 3-hour check: Group D—2.44, Group W—2.81, Group C—2.25; at 24-hour check: Group D—5.12, Group W—4.25, Group C—4.83). Thus, the presence of extra nest material within the reach of an incubating Laughing Gull stimulated some nestbuilding, but the likelihood of

TABLE 1

NUMBER OF MARKED REEDS BUILT WHOLLY INTO TREATED OR UNTREATED HALF OF RIM AT 3-HOUR AND 24-HOUR CHECKS.

Group	Treated	Untreated
	3-hour check	
D	21	1
W	6	8
C	4	2
	24-hour check	
D	31	5
W	7	11
C	4.5*	5.5*

* Half a broken reed in each half of nest. Unbroken reeds extending into both halves of the nest were not counted.

building under these circumstances was not increased by either a damaged or a wet nest.

Damaging the nest by removing a portion of the rim did, however, affect the pattern of sideways-building. Sideways-building was more frequently directed to the cut side of the rim as measured by comparing the number of marked reeds built into the treated half and the untreated half. Group D nests had significantly (Sign test $p \leqslant .03$: Siegel 1956) more reeds wholly in the treated half at both the 3- and 24-hour checks, while there were no significant differences in the way the 2 halves were treated by Groups W and C (Table 1).

Clearly, Laughing Gulls are capable of using information about the state of their nest to direct their sideways-building movements to areas of the rim where nest material is missing, even during mid-incubation. This contrasts to some extent with the behavior of weaver-birds. These birds will directly repair holes in their complex nests, but the repair behavior is best during the early stages of construction and may be aberrant or may not occur after the nest is occupied (Crook 1964). The control of nestbuilding behavior may change to some extent during the breeding cycle of Laughing Gulls as nests occupied by chicks are different from nests occupied by eggs. It would be instructive to investigate reaction to nest damage as a function of stage of cycle in this species.

Laughing Gulls did not respond to nest dampness as defined by this experiment by covering damp areas with additional nest material. If sideways-building is indeed adjusted to fit the wetness of the nest site, then Laughing Gulls may use more distal cues, such as level of high tide, for this purpose.

The results of this study lead to 2 conclusions. First, nestbuilding behavior of Laughing Gulls is directed by feedback from the state of the nest. Second, sideways-building can be modified by stimulation appropriate to nest-building even during the incubation phase of the cycle. These results add support to Beer's (1963b) contention that it is misleading to explain nestbuilding during incubation in terms of displacement.

SUMMARY

Nestbuilding activity of incubating Laughing Gulls was concentrated on experimentally damaged parts of the nest. This demonstrates that sideways-building is guided by feedback from the nest even when it occurs during incubation.

ACKNOWLEDGMENTS

I thank Drs. George F. Michel and Colin G. Beer for their assistance. I also thank the U. S. Fish and Wildlife Service for permission to work in the Brigantine Wildlife Refuge, and the Refuge Manager and his staff for their cooperation. The work was supported by PHS Grant #GM12774 to C. G. Beer. I was an NIH Predoctoral Fellow (No. 5 F1 MH-25,560) during the course of the experiment. This is publication No. 187 from the Institute of Animal Behavior.

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